

AMENDMENTS TO THE CLAIMS

1. (Original) A clock extracting device of a disc reproducing apparatus, comprising:
 - an information read-out means for reading information signals from a disklike information recording medium;
 - a voltage control oscillator;
 - a phase comparator for comparing a phase of the information signals read by the information read-out means and a phase of an output of the voltage control oscillator;
 - a frequency comparator for comparing a frequency of the information signals read by the information read-out means and a frequency of the output of the voltage control oscillator;
 - a speed sensor for detecting the frequency of the output of the voltage control oscillator at a reference clock so as to output a speed signal;
 - a gain command unit for designating a loop gain of a clock extracting circuit in accordance with the speed signal outputted from the speed sensor;
 - a charge pump which discharges or draws electric current in accordance with outputs of the phase comparator and the frequency comparator and changes over an output current value in accordance with a gain command of the gain command unit; and
 - a series circuit of a resistor and a capacitor, whose one end is connected to an output of the charge pump and the other end of which is grounded or is connected to a reference voltage;
- wherein an output voltage between the opposite ends of the series circuit acts as a control voltage for the voltage control oscillator and the gain command unit issues the gain

command such that the loop gain of the clock extracting circuit secures a desired operating point in accordance with a read rate of the information signals.

2. (Original) A clock extracting device of a disc reproducing apparatus, comprising:
 - an information read-out means for reading information signals from a disklike information recording medium;
 - a numerical control oscillator;
 - a phase comparator for comparing a phase of the information signals read by the information read-out means and a phase of an output of the numerical control oscillator;
 - a frequency comparator for comparing a frequency of the information signals read by the information read-out means and a frequency of the output of the numerical control oscillator;
 - a speed sensor for detecting the frequency of the output of the numerical control oscillator at a reference clock so as to output a speed signal;
 - a gain command unit for designating a loop gain of a clock extracting circuit in accordance with the speed signal outputted from the speed sensor;
 - a multiplier for changing a multiplication factor in accordance with a gain command of the gain command unit so as to amplify outputs of the phase comparator and the frequency comparator; and
 - a digital filter for amplifying a low frequency band of an output of the multiplier;

wherein an output of the digital filter acts as a control input for the numerical control oscillator and the gain command unit issues the gain command such that the loop gain of the clock extracting circuit secures a desired operating point in accordance with a read rate of the information signals.

3. (Currently Amended) A clock extracting device as claimed in Claim 1, wherein the gain command unit issues the gain command in accordance with a range signal indicating in which one of a plurality of speed ranges divided by one predetermined reference value or more the speed signal falls.

4. (Currently Amended) A clock extracting device as claimed in Claim 2, wherein the gain command unit issues the gain command in accordance with a range signal indicating in which one of a plurality of speed ranges divided by one predetermined reference value or more the speed signal falls.

5. (Original) A clock extracting device as claimed in Claim 3, wherein even if the range signal changes upon change of the speed signal from one of the speed ranges to a neighboring one of the speed ranges, the gain command unit does not change the gain command when a difference between the speed signal and the predetermined reference value for dividing the one and the neighboring one of the speed ranges is not more than a predetermined value.

6. (Original) A clock extracting device as claimed in Claim 4, wherein even if the range signal changes upon change of the speed signal from one of the speed ranges to a neighboring one of the speed ranges, the gain command unit does not change the gain command when a difference between the speed signal and the predetermined reference value for dividing the one and the neighboring one of the speed ranges is not more than a predetermined value.

7. (Original) A clock extracting device as claimed in Claim 3, wherein even if the range signal changes, the gain command unit does not change the gain command during a predetermined period after the gain command has been changed.

8. (Original) A clock extracting device as claimed in Claim 4, wherein even if the range signal changes, the gain command unit does not change the gain command during a predetermined period after the gain command has been changed.

9. (Original) A clock extracting device as claimed in Claim 5, wherein even if the range signal changes, the gain command unit does not change the gain command during a predetermined period after the gain command has been changed.

10. (Original) A clock extracting device as claimed in Claim 6, wherein even if the range signal changes, the gain command unit does not change the gain command during a predetermined period after the gain command has been changed.

11. (New) A clock extracting device of a disc reproducing apparatus, comprising:

- an optical pickup operable to read information signals from a disklike information recording medium;
- a voltage control oscillator;
- a phase comparator operable to compare a phase of the information signals read by the optical pickup and a phase of an output of the voltage control oscillator;
- a frequency comparator operable to compare a frequency of the information signals read by the optical pickup and a frequency of the output of the voltage control oscillator;
- a speed sensor operable to detect the frequency of the output of the voltage control oscillator at a reference clock so as to output a speed signal;
- a gain command unit operable to designate a loop gain of a clock extracting circuit in accordance with the speed signal outputted from the speed sensor;
- a charge pump operable to discharge or draw electric current in accordance with outputs of the phase comparator and the frequency comparator and changes over an output current value in accordance with a gain command of the gain command unit; and
- a series circuit of a resistor and a capacitor, whose one end is connected to an output of the charge pump and the other end of which is grounded or is connected to a reference voltage;

wherein an output voltage between the opposite ends of the series circuit acts as a control voltage for the voltage control oscillator and the gain command unit issues the gain

command such that the loop gain of the clock extracting circuit secures a desired operating point in accordance with a read rate of the information signals.

12. (New) A clock extracting device of a disc reproducing apparatus, comprising:

- an optical pickup operable to read information signals from a disklike information recording medium;

- a numerical control oscillator;

- a phase comparator operable to compare a phase of the information signals read by the optical pickup and a phase of an output of the numerical control oscillator;

- a frequency comparator operable to compare a frequency of the information signals read by the optical pickup and a frequency of the output of the numerical control oscillator;

- a speed sensor operable to detect the frequency of the output of the numerical control oscillator at a reference clock so as to output a speed signal;

- a gain command unit operable to designate a loop gain of a clock extracting circuit in accordance with the speed signal outputted from the speed sensor;

- a multiplier operable to change a multiplication factor in accordance with a gain command of the gain command unit so as to amplify outputs of the phase comparator and the frequency comparator; and

- a digital filter operable to amplify a low frequency band of an output of the multiplier;

wherein an output of the digital filter acts as a control input for the numerical control oscillator and the gain command unit issues the gain command such that the loop gain of the clock extracting circuit secures a desired operating point in accordance with a read rate of the information signals.

13. (New) A clock extracting device as claimed in Claim 11, wherein the gain command unit issues the gain command in accordance with a range signal indicating in which one of a plurality of speed ranges divided by one predetermined reference value or more the speed signal falls.

14. (New) A clock extracting device as claimed in Claim 12, wherein the gain command unit issues the gain command in accordance with a range signal indicating in which one of a plurality of speed ranges divided by one predetermined reference value or more the speed signal falls.

15. (New) A clock extracting device as claimed in Claim 13, wherein even if the range signal changes upon change of the speed signal from one of the speed ranges to a neighboring one of the speed ranges, the gain command unit does not change the gain command when a difference between the speed signal and the predetermined reference value for dividing the one and the neighboring one of the speed ranges is not more than a predetermined value.

16. (New) A clock extracting device as claimed in Claim 14, wherein even if the range signal changes upon change of the speed signal from one of the speed ranges to a neighboring one of the speed ranges, the gain command unit does not change the gain command when a difference between the speed signal and the predetermined reference value for dividing the one and the neighboring one of the speed ranges is not more than a predetermined value.

17. (New) A clock extracting device as claimed in Claim 13, wherein even if the range signal changes, the gain command unit does not change the gain command during a predetermined period after the gain command has been changed.

18. (New) A clock extracting device as claimed in Claim 14, wherein even if the range signal changes, the gain command unit does not change the gain command during a predetermined period after the gain command has been changed.

19. (New) A clock extracting device as claimed in Claim 15, wherein even if the range signal changes, the gain command unit does not change the gain command during a predetermined period after the gain command has been changed.

20. (New) A clock extracting device as claimed in Claim 16, wherein even if the range signal changes, the gain command unit does not change the gain command during a predetermined period after the gain command has been changed.